

RP SERIES
ROTOR PUMP

INSTRUCTION MANUAL

■ RP**A-**-30

(PRESSURE COMPENSATOR TYPE)

① : 1996. 7. 23

DAIKIN INDUSTRIES, LTD
OIL HYDRAULICS & LUBRICATION DIV.

C O N T E N T S

1. FOREWORD	3
2. NOMENCLATURE	4
3. SPECIFICATIONS AND OPERATING CONDITIONS	5
4. STRUCTURE AND FUNCTION	
4-1. STRUCTURE	8
4-2. FUNCTION	9
4-3. PRESSURE COMPENSATOR CONTROL	9
5. INSTALLATION, PIPING AND WIRING	
5-1. INSTALLATION AND PIPING	12
5-2. OIL FILLING INTO PUMP HOUSING	17
5-3. WIRING	17
6. TEST RUN	19
6-1. Flushing Operation	20
6-2. Operation	21
7. MAINTENANCE AND INSPECTION	22
8. STORAGE	22
9. TROUBLESHOOTING	23
10. REFERENCES	
10-1. STRUCTURAL DRAWINGS	27
10-2. OUTPUT POWER RANGE	30
10-3. ADJUSTMENT OF DISCHARGE FLOW	34
10-4. ADJUSTMENT OF DISCHARGE PRESSURE	37

1. FOREWORD

The RP Series ROTOR PUMP is a variable displacement piston pump integral with an electric motor cooled by hydraulic oil which was designed and engineered as the hydraulic pressure source for machine tools and general industrial machines, based on the design concept of thoroughly seeking "Low Noise" and "Compact". This ROTOR PUMP provides various outstanding features due to its unique structure different from that of the conventional motor pump (directly coupled to motor shaft).

Before putting this ROTOR PUMP in initial operation, operator and maintenance man are requested to read carefully this Instruction Manual for proper operation and maintenance control.

In order to keep safety, installation and maintenance of ROTOR PUMP should be restricted by skilled person only.

This is important to keep the specific pump performance and function throughout a long time.

2. NOMENCLATURE

RP	**	A	*	—	**	*	—	30
								Design Number
								Voltage supply
								<ul style="list-style-type: none"> • — : 200/220/220V-50/60/60Hz • X : 230V-50Hz • Y : 380/400/415/400/440/460V-50/50/50/60/60/60Hz
								Motor Capacity/Poles
								<ul style="list-style-type: none"> • 07 : 0.75kW/4P • 15 : 1.5kW/4P • 22 : 2.2kW/4P • 37 : 3.7kW/4P • 55 : 5.5kW/4P
								Pressure Adjustment Range
								<ul style="list-style-type: none"> • 1 : 1.5 ~ 6.9MPa {15 ~ 70kgf/cm²} • 2 : 1.5 ~ 13.7MPa {15 ~ 140kgf/cm²} • 3 : 3.4 ~ 20.6MPa {35 ~ 210kgf/cm²}
								Control
								<ul style="list-style-type: none"> • A : Pressure Compensator Control
								Theoretical Displacement
								<ul style="list-style-type: none"> • 08 : 8.0 cm³/rev {cc/rev} • 15 : 14.8 cm³/rev {cc/rev} • 23 : 24.4 cm³/rev {cc/rev} • 38 : 37.7 cm³/rev {cc/rev}
								Series
								<ul style="list-style-type: none"> • RP : RP Series Rotor Pump

3. Specifications and Operating conditions

■	Type of electric motor	-----	3 phase induction motor		
■	Type of hydraulic pump	-----	Variable displacement piston pump		
■	Power supply	-----	AC 3 ϕ 200V/50Hz 200V/60Hz 220V/60Hz (Refer to Nomenclature)		
■	Theoretical displacement of pump	-----	<ul style="list-style-type: none"> • 08 : 8.0 cm³/rev {cc/rev} • 15 : 14.8 cm³/rev {cc/rev} • 23 : 24.4 cm³/rev {cc/rev} • 38 : 37.7 cm³/rev {cc/rev} 		
■	Motor capacity/Poles (Continuous rated output)	-----	<ul style="list-style-type: none"> • 07 : 0.75kW/4P • 15 : 1.5kW/4P • 22 : 2.2kW/4P • 37 : 3.7kW/4P • 55 : 5.5kW/4P 		
■	Motor rated current				
RP08-07	-----	3.8A (200V/50Hz)	3.3A (230V/50Hz)		
		3.4A (220V/60Hz)	1.9A (380V/50Hz)	1.7A (400V/60Hz)	
		3.4A (220V/60Hz)	1.9A (400V/50Hz)	1.7A (440V/60Hz)	
			1.9A (415V/50Hz)	1.7A (460V/60Hz)	
RP15-15	-----	6.8A (200V/50Hz)	5.9A (230V/50Hz)		
		6.0A (200V/60Hz)	3.5A (380V/50Hz)	3.0A (400V/60Hz)	
		5.8A (220V/60Hz)	3.4A (400V/50Hz)	2.9A (440V/60Hz)	
			3.3A (415V/50Hz)	2.8A (460V/60Hz)	
RP15-22	-----	9.6A (200V/50Hz)	8.3A (230V/50Hz)		
		8.8A (200V/60Hz)	4.8A (380V/50Hz)	4.4A (400V/60Hz)	
		8.4A (220V/60Hz)	4.8A (400V/50Hz)	4.2A (440V/60Hz)	
			4.7A (415V/50Hz)	4.1A (460V/60Hz)	
RP23-22	-----	10.0A (200V/50Hz)	8.6A (230V/50Hz)		
		9.2A (200V/60Hz)	5.0A (380V/50Hz)	4.5A (400V/60Hz)	
		8.7A (220V/60Hz)	5.0A (400V/50Hz)	4.3A (440V/60Hz)	
			5.1A (415V/50Hz)	4.4A (460V/60Hz)	
RP23-37	-----	15.1A (200V/50Hz)	13.1A (230V/50Hz)		
		14.7A (200V/60Hz)	7.8A (380V/50Hz)	7.3A (400V/60Hz)	
		13.4A (220V/60Hz)	7.5A (400V/50Hz)	6.6A (440V/60Hz)	
			7.4A (415V/50Hz)	6.4A (460V/60Hz)	
RP38-37	-----	15.1A (200V/50Hz)	13.1A (230V/50Hz)		
		14.7A (200V/60Hz)	7.8A (380V/50Hz)	7.3A (400V/60Hz)	
		13.4A (220V/60Hz)	7.5A (400V/50Hz)	6.6A (440V/60Hz)	
			7.4A (415V/50Hz)	6.4A (460V/60Hz)	
RP38-55	-----	22.0A (200V/50Hz)	19.0A (230V/50Hz)		
		21.2A (200V/60Hz)	11.4A (380V/50Hz)	10.5A (400V/60Hz)	
		19.6A (220V/60Hz)	11.0A (400V/50Hz)	9.7A (440V/60Hz)	
			10.9A (415V/50Hz)	9.4A (460V/60Hz)	

■ Maximum allowable working pressure

RP08-07	-----	13.7MPa { 140kgf/cm ² }
RP15-15	-----	13.7MPa { 140kgf/cm ² }
RP15-22	-----	20.6MPa { 210kgf/cm ² }
RP23-22	-----	13.7MPa { 140kgf/cm ² }
RP23-37	-----	20.6MPa { 210kgf/cm ² }
RP38-37	-----	13.7MPa { 140kgf/cm ² }
RP37-55	-----	20.6MPa { 210kgf/cm ² }

■ Hydraulic output power range -- Refer to Clause 9.2

■ Hydraulic control ----- Pressure compensator control
(PC Control)

■ Suction port size

RP08-07	-----	Flange connection (4)M10bolts (Flange:JIS B2291 SHA15)
RP15	-----	Flange connection (4)M10bolts (Flange:JIS B2291 SSB20)
RP23, 38	-----	Flange connection (4)M10bolts (Flange:SAE J518 1 1/4" split flqange)

■ Discharge port size

RP08, 15	-----	Tapered thread Rc 3/8" (inch)
RP23, 38	-----	Tapered thread Rc 3/4" (inch)

■ Drain port size

RP08, 15	-----	Tapered thread Rc 3/8" (inch)
RP23, 38	-----	Tapered thread Rc 1/2" (inch)

- Hydraulic oil ----- Mineral base oil R&O/Anti wear oil
 - Viscosity grade ----- ISO VG 32 ~ 68
 - Viscosity range ----- 15 ~ 400 mm²/s {cSt}
 - Oil temperature range
 - in reservoir ----- 0 ~ 60 °C
 - Water content ----- Less than 0.1 vol%
 - Contaminant level ----- Less than NAS 9 class

= Precautions =

- Use mineral base oil as hydraulic (fluid) oil. Use of other hydraulic oil (water contained/synthetic base) is not allowed because it results in short-circuiting and leakage.

- Allowable inlet
 - absolute pressure ----- 84~300 kPa {0.83~3 kgf/cm²}
- Maximum case pressure ----- 0.1 MPa {1 kgf/cm²}
- Oil volume in case
 - RP08-07----- 1100cm³ {cc}
 - RP15-15----- 2300cm³ {cc}
 - RP15-22----- 2300cm³ {cc}
 - RP23-22----- 4500cm³ {cc}
 - RP23-37----- 4000cm³ {cc}
 - RP38-37----- 4000cm³ {cc}
 - RP38-55----- 3500cm³ {cc}
- Protection ----- IP54
- Insulation class ----- E-class
- Ambient conditions----- Atmospheric
 - Temperature ----- -20 ~ 40 °C
 - Humidity ----- 20 ~ 95%
 - Altitude ----- up to 4000 m
- Mass
 - RP08-07 ----- 35 kg
 - RP15-15 ----- 55 kg
 - RP15-22 ----- 55 kg
 - RP23-22 ----- 67 kg
 - RP23-37 ----- 73 kg
 - RP38-37 ----- 73 kg
 - RP38-55 ----- 87 kg

4. Structure and Function (Refer to Section 10-1 Structural Drawings)

4-1 Structure

- Rotor pump body is composed of a housing(41) and a front cover(31).
The terminal board(4) for power supply is attached to the housing
and a pressure compensator control valve(11) to the front cover
respectively.
- Motor stator(36) is fixed to the inner housing and motor rotor(38-1)
and cylinder block(38-2) interference-fitted in it are retained at
the rotor center by shaft(37).
This shaft is supported in free rotation with the bearing units(43)
in the housing and the front cover.
- The cylinder block assembly composed of piston assembly(35), retainer(45),
spring(38-5), etc. acts as a pump.
- Variable swash plate(34) intended to control the piston reciprocating
stroke is built in between the piston head side of the cylinder block
assembly and the front cover. At the counterside of the cylinder block
assembly, valve plate(39) action as the rotary sliding surface of the
cylinder block is fixed to the housing.
- The variable swash plate unit is composed of swash plate and bias piston
(47), control piston(55), spring(49), etc. to control the swash plate
angle. The swash plate can smoothly swash on the journal bearing(58) of
swash plate holder which is housed in the front cover.
- The valve plate distributes oil in the piston bore of the cylinder
block to the suction port and discharge port which are both opened to
the housing.

4-2 Function

- The rotor and the cylinder block kit are rotated by the motor and simultaneously pistons inside the cylinder block reciprocate along the swash plate.
- This reciprocal motion results in volumetric displacement of the piston bore, whereby continuous sucking and discharging are effected.
- The volumetric displacement in the piston bore varies with each swash angle of the swash plate. Hence, the discharge rate can be increased/reduced by adjusting and setting the swash angle to an intended degree. (Refer to Subsection 10-3 "Adjustment of Discharge Rate".)

4-3 Pressure Compensator Control (Abbreviated as " PC Control ")

- Usually the swash plate is kept at the preset maximum swash degree by bias pistons with spring into which discharge pressure is supplied, and oil volume equivalent to this swash plate angle is discharged. (Fig. 1 : A, B)

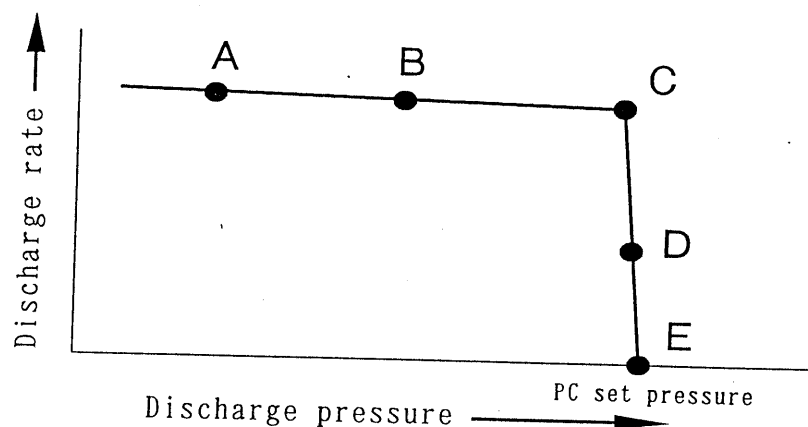


Fig. 1

- The discharge pressure is partly induced into the spool end face of the PC control valve. When the pressure is further raised up to nearly the adjusted and set pressure (PC set pressure) by means of a spring internally provided in the PC valve (Fig. 1, C), the spool is shifted due to the pressure rise, then permitting the oil discharged to be reduced. The reduced pressure is fed as control pressure into the control piston. (Fig. 2)

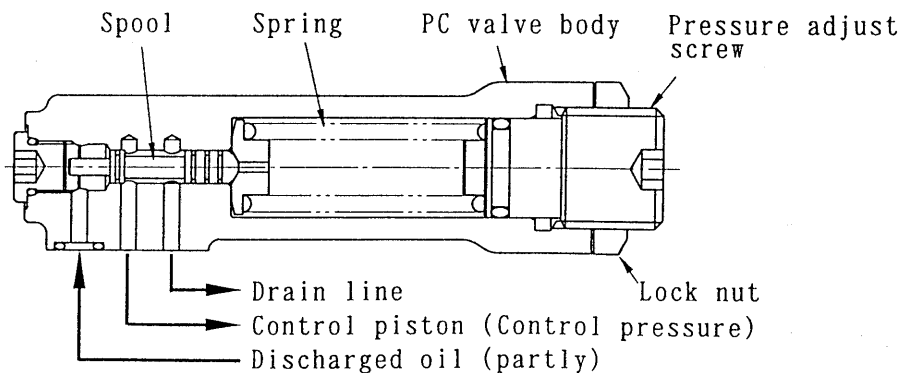


Fig. 2

- Due to action of the control pressure, the control piston makes the swash plate angle smaller against the bias piston and the spring and thereby reduces the discharge rate. In this case, the discharge pressure, control pressure and discharge rate are balanced automatically and stably. (Fig. 1 : C → D → E)
- When the discharge pressure has reached the PC set pressure, the swash plate angle is nearly 0° (neutral position) and the discharge rate comes down to zero, with the discharge pressure kept at the PC set pressure. Such a condition is called "Dead Head" or "Full Cut-off". In this case, the swash plate is in slight tilt corresponding to the replenishment rate against drain. (Fig. 1 : E)

- If the discharge pressure comes down slightly from this dead head condition the control pressure supplied into the control piston reduces correspondingly so that the swash plate is pushed toward the maximum swash angle by the bias piston with spring and then permits increasing of the discharge rate. (Fig. 1 : E → D → C)
- When the discharge pressure further comes down with discharging, the control piston pressure is released into the drain line so that the swash plate return to the initially preset maximum swash angle and the discharge rate is restored. (Fig. 1 : C → B, A)
- Further, the pressure compensation control system can stably hold pressure and flow rate at optional points A to E in Fig. 1. However, continuous operation is not available in the area beyond motor capacity. Furthermore, even under step operating condition like A → E and A ← E in Fig. 1, the discharge pressure passes through C-point instantaneously. In this C-point exceeds greatly the motor capacity, further continued operation will be occasionally unavailable. (Refer to Subsection 9-2 "Output Range".)

5. Installation, Piping and Wiring

5-1 Installation and Piping

5-1-1 Installation

- When carrying the Rotor Pump individual to the installation site, lift it using the eye bolts (2 pcs.) after attaching them to the upper body.
In handling, be careful not to give strong impact to it.
- Install the pump, with its case drain inlet plug upside and vibration-absorbing rubber downside. Tighten four foot bolts after complete levelling of the pump body.
The size and tightening force of these bolts are as follows;

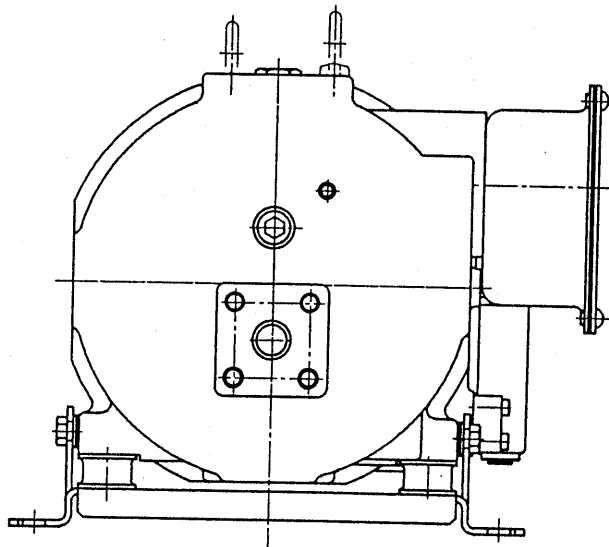
	RP 0 8	RP 1 5、2 3, 3 8
Thread for tightening Bolts	M8, Depth 16 mm	M10, Depth 20 mm
Tightening force	27-34N・m {277-346kgf・cm}	53-67N・m {544-680kgf・cm }

= Precautions =

- Before lifting, be sure to check that each eye-bolt is completely screwed in the body and apply two-rope lifting.
Incomplete screwing-in or one-rope lifting will possibly cause drop accident.
- Two eye bolts attached to the body are just for lifting use.
Avoid lifting the pump body together with tank base, ect. by using these eye bolts after the installation.
Otherwise, the weights of the tank base, etc. will act on the vibration absorbing rubber between the body and the foot, then causing damage or drop accident.
- The surface temperature of the pump body rises occasionally up to around 80 °C while the Rotor Pump is running.
Therefore, keep a sufficient space around it and also don't leave other material in contact with it.
- For protection against contact with hot surface of the pump body, proper cover should be fitted.

= Precautions =

- The fixture provided between the body and the foot is intended to facilitate piping work and to protect the vibration absorbing rubber as well. Keep the fixture as attached until start of test run. Further, when it is forecast that rubber vibration of wide amplitude acts on the vibration absorbing rubber due to transportation and repiping, even after installation of the pump body, re-attach the fixture to protect the rubber.



The fixture : One bolt and two washers (Both side)

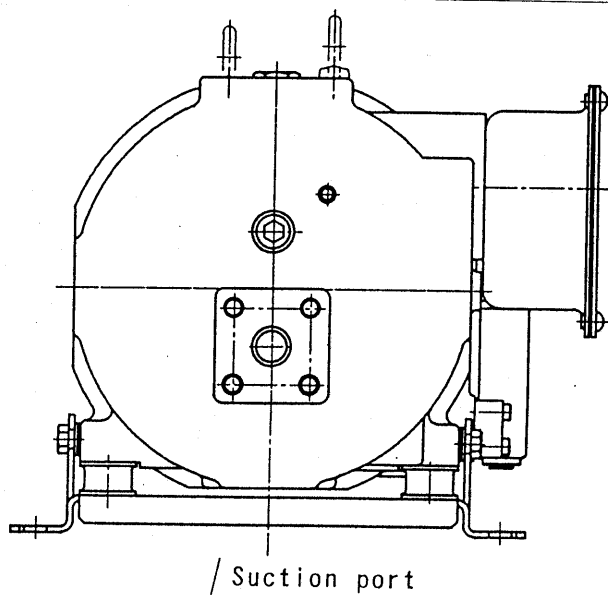
5-1-2 Piping

5-1-2-1 Suction line

○ Install the suction pipeline so that the inlet absolute pressure at the suction port is maintained from 84 to 300 kPa (0.83~3 kgf/cm²). Suction pressure exceeding this permissible limit or inclusion of air in the oil will occasionally result in abnormal noise and vibration. Therefore, the piping work should be performed with good attention to the following items.

- (1) Select joint specification and pipe size conforming to the above requirement.
- (2) Avoid use of a bend and make the suction pipe within 2m.
- (3) Keep each joint part perfectly airtight.
- (4) Keep the height of the suction port within 1 m from the oil level in tank.
- (5) When installing the body above the oil level in tank, don't install the suction pipe above the suction port level. This is to prevent air pocket inside the pipeline.

	RP 0 8	RP 1 5、2 3、3 8
Thread for tightening Bolts	M8, Depth 16 mm	M10, Depth 20 mm
Tightening force	27-34N·m (277-346kgf·cm)	53-67N·m (544-680kgf·cm)

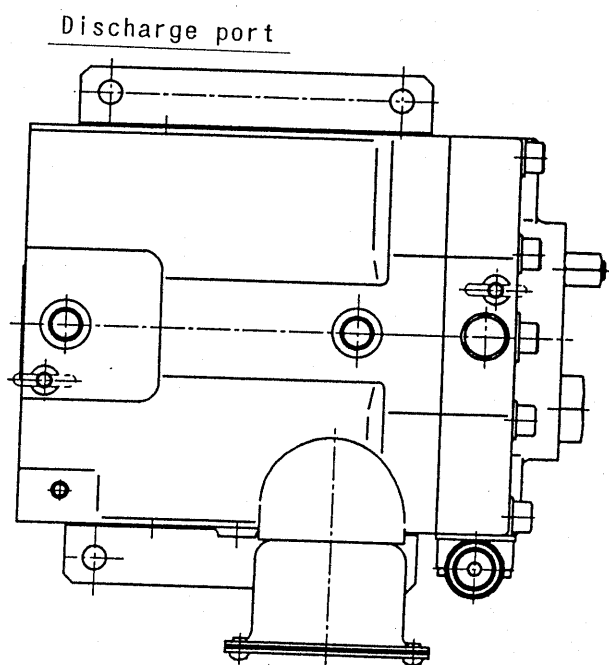


○ Apply a 150-mesh suction filter to the suction line.

5-1-2-2 Discharge line

- Even in discharge piping work, pay attention to the above items (1) to (3). Furthermore, apply a line filter (25 micron max.) to the return line to tank.
- In order to prevent abnormal pressure rise to check system pressure, install the relief valve and pressure gauge in discharge line.
- In case of pump failure, if the return flow volume from discharge line to suction line exceeds tank capacity, install check valve in discharge line.

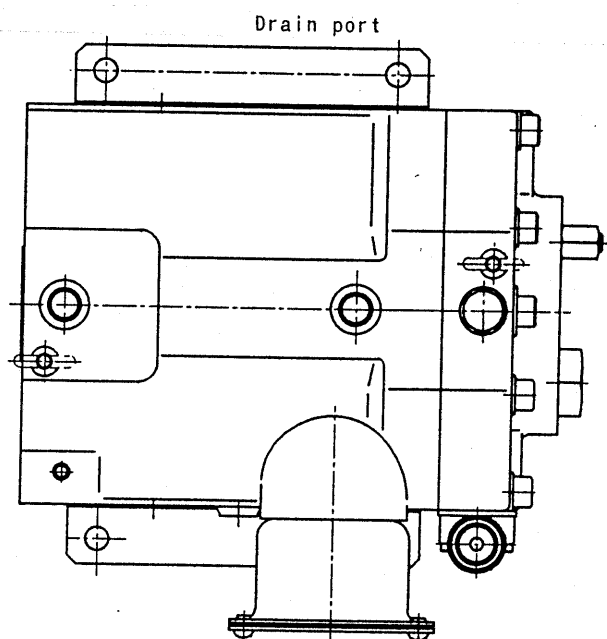
	RP 0 8, 1 5	RP 2 3, 3 8
Port size	Rc 3/8"(inch)	Rc 3/4"(inch)
Tightening force	59N·m (600kgf·cm)	98N·m (1000kgf·cm)
Pressure capability	Max. pressure x 1.5 MPa	
Seal material	Polytetrafluoroethylene (PTFE)	



5-1-2-3 Drain line

- In drain piping work, pay attention to the following items in addition to the above items (1) to (3).
- (6) Locate the return line to tank below the oil level and remote it as far as possible from the opening of the suction line.
- (7) Install the drain line in independent form, without covering with other return line, so that the case internal pressure is maintained at 0.1 MPa (1 kgf/cm²) max., with reference to the table below.

	RP 0 8, 1 5	RP 2 3, 3 8
Pipe size	3/8" (inside dia. ϕ 8.5 min.)	1/2" (inside dia. ϕ 10.5 min.)
Inside dia. of pipe	ϕ 12 min.	ϕ 15 min.
Pipe length	1m max.	
Tightening force	59N·m (600kgf·cm)	98N·m (1000kgf·cm)

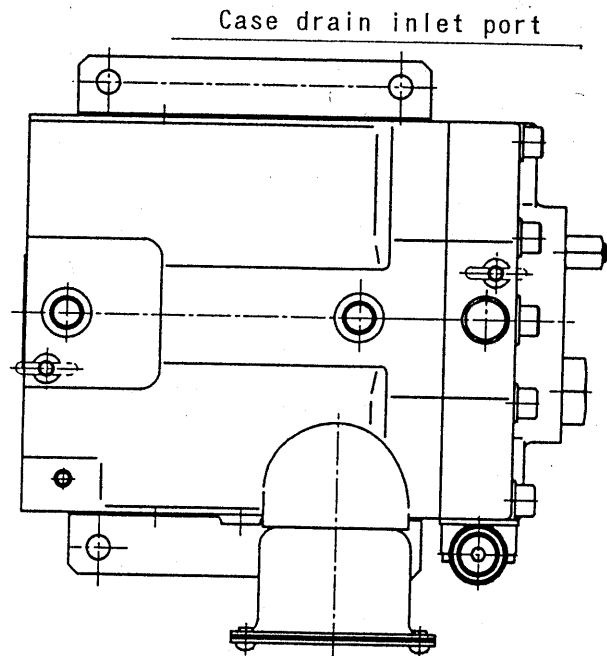


= Precautions =

- Rotor Pump is provided with a vibration absorbing rubber as a standard between its body and foot, which is intended to damp structural transfer noise arising from vibration transfer in order to enable the pump to effectively fulfill the low noise running as one of its features. Due to this reason, each pipeline is required to have flexibility.
- Inflexible steel pipe will possibly cause not only increase of noise level and vibration amplitude but also oil leak or damage the pipeline. To avoid such a possible trouble, apply (at least partially) flexible piping (e.g. hose) so as not to give abnormal piping load to the pump body.

5-2 Oil Filling into Pump Housing

- Before starting the Rotor Pump, remove the case drain inlet plug from the housing top and then feed specific hydraulic oil(fluid oil) into the housing up to full level, through the case drain inlet port. After that, restore the case drain inlet plug. The oil volume to be fed is listed in page 7.



= Precautions =

- Never run pump without oil filled to prevent the internal component from severe damage.
- Use mineral base oil as hydraulic (fluid) oil. Use of other hydraulic oil (water-contained/synthetic base) is not allowed because it results in short-circuiting and leakage.

5-3 Wiring

- Add circuit breaker to the main power line to protect the electric circuit from over-current (short-circuit, etc.) and the motor from overload. In addition, provide a earth leakage breaker(15mA). (Refer to motor rated current in Page 5)
- After removing the cover of the terminal box which is attached to the side face of the Rotor Pump, guide the cable through the wiring port of the terminal box. In this case, use a conduit, etc. suitable to the wiring port size (23mm dia. for RP08 to RP38-37 and 27mm dia. for RP38-55).

- Connect the cable to the terminal block as illustrated in Fig. 3.
For wiring connection, use a solderless terminal of proper size and tighten the M5 screw with specific tightening torque so as to prevent inter-phase short-circuiting and leakage into the housing.
Further, don't apply any tension to the connections.

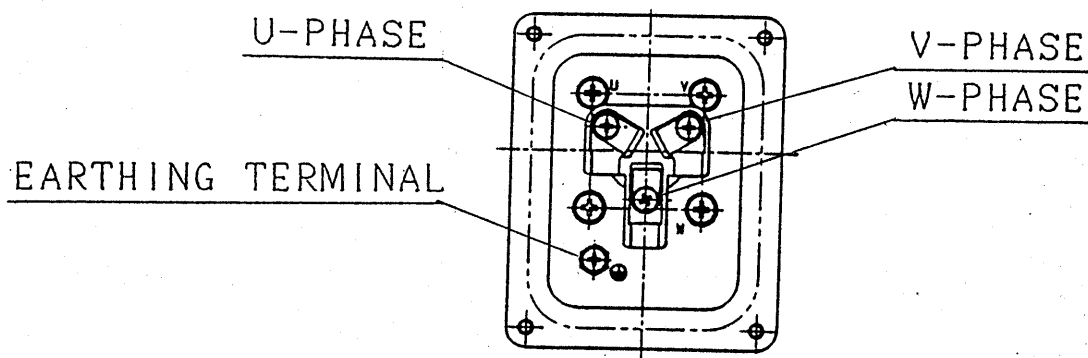


Fig.3

	U, V, W-PHASE	EARTH TERMINAL
Thread size	M 5	M 5
Tightening force (cN·m)	300 - 400	300 - 400

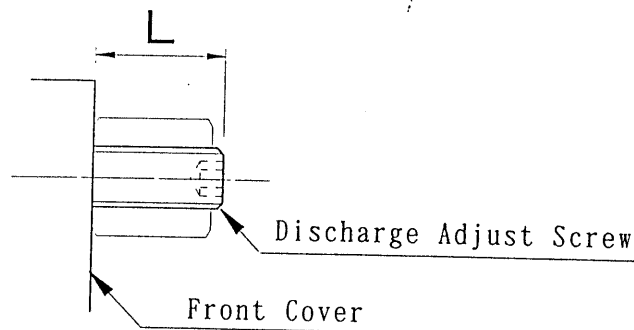
- After the wiring connection, securely restore the terminal box cover.

= Warning =

- Improper electric wiring non-conforming to the instructions given in 5-3 will cause not only functional failure and trouble of the Rotor Pump but also dangerous accident. Therefore, electric wiring work must carefully be performed in compliance with the instructions given in this Subsection.

6. Test Run

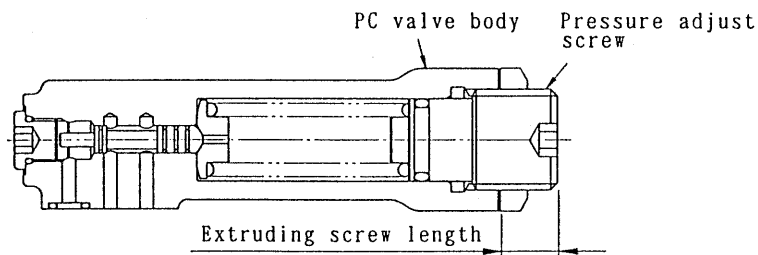
- Be sure to check that the hydraulic circuit and the electric circuit including the Rotor Pump are all ready for operation start. Put the hydraulic circuit in unload condition. In addition, check the cylinder actuator, etc. for normal functioning and safety.
- Remove the fixture which is provided between the Rotor Pump body (housing) and the foot. Store the removed fixture and reuse it to protect the vibration absorbing rubber when moving the Rotor Pump to other place or performing repiping work.
- Set the length of discharge adjust screw provided on the front cover of the Rotor Pump more than $2/3Q_{max}$.
In case of small discharge rate, the sucking performance at starting may occasionally become inadequate. (Refer to Subsection 10-3 " Adjustment of Discharge Rate " .)



= Precautions =

- To prevent oil leakage from the threaded portion, keep the minimum extruding screw length from the front cover surface. (Refer to 10-3. Adjustment of discharge flow)
- The minimum PC setting pressure is 1.5 MPa, and corresponding to extruding length is 13mm.

- Loosening too much the pressure adjust screw of the pressure compensator control valve will result in oil leakage from the threaded portion or cause the pressure adjust screw and the valve internal component(s) to dangerously come out together with oil. Therefore, **keep the extruding screw length from PC valve body within 13.5 mm.**



- The adjust screw is mechanically stopped by the valve body. Therefore the setting pressure of PC valve does not exceed Maximum setting pressure x 1.25 MPa.
- For adjustment of the PC set pressure, refer to Subsection 10-4 "Adjustment of Discharge Pressure".

6-1 Flushing Operation

- Apply flushing operation to the Rotor Pump for complete removal of harmful contaminants which remain inside the pipelines and the tank after assembly of the hydraulic circuit.
- ① Start the Rotor Pump in inching mode by repeating several cycles of power switch ON-OFF operation. At the same time, be sure to confirm norm rise of the outlet pressure. In the case of putting the Rotor Pump in initial operation, it takes a little more time for pressure rise due to air existing in the hydraulic circuit. However, when the pressure fails to rise even after 5 minutes and over from pump start, check the wiring because the possible cause is reverse rotation of the motor due to wrong wiring connection to the motor.
(Refer to Subsection 5-3 "Electric Wiring", (Fig. 3).)

- ② Existence of air in the hydraulic circuit, if any, will result in abnormal noise and vibration or unstable functioning of the actuator. To avoid such troubles, completely purge air out of the hydraulic circuit by inching as discribed above item ①.
- ③ After ihching for sevrsl cycles, let the ROTOR PUMP run about 2 to 3 hours, with the circuit pressure kept at low value (1 to 1.5 MPa { 10 to 15kgf/cm² }). During this flushing operation, be sure to check that no oil leaks from the pipeline, etc.
- ④ After the flushing operation, completely drain hydraulic oil out of the tank and refill fresh hydraulic oil. At the same time, clean or replace both the line filter and the suction filter with new ones, if clogged and contaminated.

6-2 Operation

- For the pump operation, follow the flushing operation sequence.
- For the operating conditions, comply with the requirements and conditions given in Section 3 "Specifications and Operating Conditions".

= Precautions =

- Occasionally the surface temperature of the pump casing rises up to about 80 °C while the Rotor Pump is running. This is not abnormal rise.
- Operating the Rotor Pump beyond the specified operation range will cause the pump not to fulfill its specific performance or result in operation failure and trouble of the pump.

7. Maintenance and Inspection

- For maintenance and inspection of the hydraulic unit overall (filter check, etc.), follow the instructions given in the individual manuals for the components of Hydraulic Unit.
Furthermore, maintain and control the operating conditions given in Section 3 "Specifications and Operating Conditions".
- For maintenance and inspection of the Rotor Pump, conduct routine check.
If something abnormal be found upon routine check, take proper action in reference to Section 8 "Troubleshooting".

Routine check items

- ① Normal start, normal pressure rise
- ② No oil leakage from the pump casing
- ③ Normal running noise
- ④ No abnormal vibration
- ⑤ Set pressure stably maintained

= Precautions =

- Continuous running of the pump in abnormal condition will cause the pump and other ambient devices not to fulfill their specific performances and, in the worst case, will result in functioning failure and trouble.
- For the hydraulic unit, the hydraulic (fluid) oil plays an important role of lubricating the internal components of each hydraulic device, in addition to the power transmission as its main role. Hence, change the hydraulic oil evry year.

8. Storage

- If the rotor pump is not used for several weeks or longer, plug or cover the inlet, outlet and drain ports to protect against dust.

9. Troubleshooting

Phenomenon-1 : Motor fails to start. It starts, but stops immediately.	
Possible caused	Counteraction
○ No specific power supply into the terminal box	○ Check the power source and the electric wiring connection so as to supply the specific power.
○ Energized No-Fuse Breaker	
(1) Overcurrent across the circuit due to faulty electric wiring (short-circuit, etc.)	(1) Check the electric wiring and take corrective measure not to permit overcurrent.
(2) Overcurrent across the circuit due to short-circuit inside the Rotor Pump.	(2) Replace the pump.
(3) Improper operating conditions and breaker capacity	(3) Apply proper operating conditions and breaker capacity.
○ Energized leakage breaker	
(1) Leakage caused by faulty electric wiring	(1) Check the electric wiring and take corrective action to prevent leakage.
(2) Leakage inside the Rotor Pump	(2) Replace the pump.

Phenomenon-2 : Motor starts, but pressure does not rise.
Specific flow rate is not reached.

Possible causes	Counteraction
○ Reverse rotation of the motor due to wrong wiring connection to the motor	○ Check wiring connection
○ Too high viscosity of hydraulic (fluid) oil	○ Check the viscosity grade and preheat it for proper viscosity
○ Suction negative pressure exceeding permissible value	○ Check the suction line for pipe/filter clogging.
○ Inclusion of air in the suction line (1) Short oil level in tank and air sucked in the oil (2) Air sucking from the suction line (3) Inclusion of air in drain pipe or return pipe due to its height above the tank oil level	(1) Increase the oil level up to specified level. (2) Check each joint part. (loose, imperfection of seals, etc.) (3) Modify piping or increase oil level.
○ Air remaining in the hydraulic circuit	○ Purge out air.
○ Fully screwed-in discharge adjust screw	○ Loosen it and increase the swash plate angle
○ Discharge line hydraulic circuit in unload or no-load condition	○ Put it in load condition.
○ Set pressure of PC valve is too low	○ Further screw-in the pressure adjust screw
○ PC valve actuating failure	○ Replace PC valve
○ Abnormal wear or damage of pump internal components	○ Replace the pump

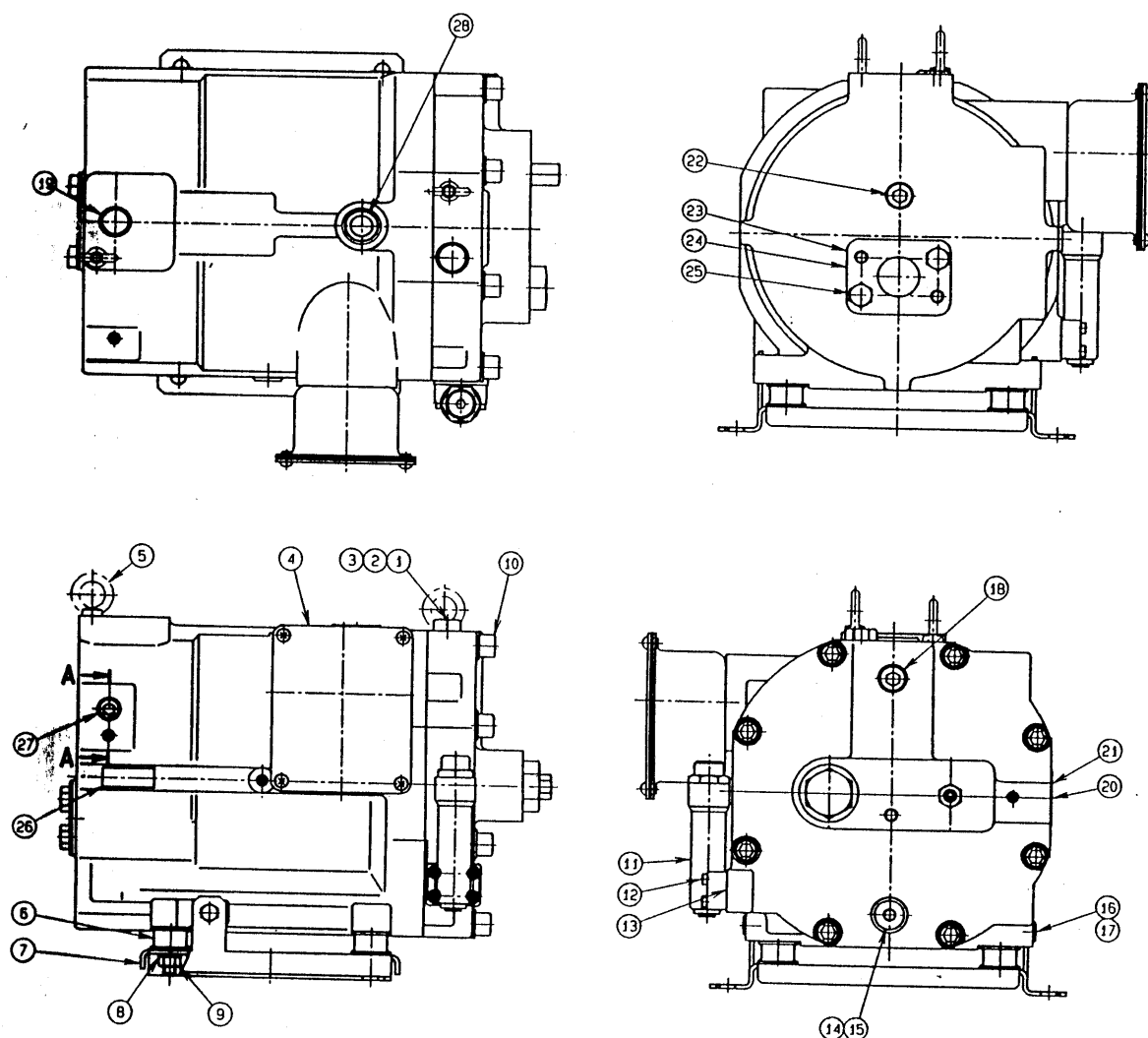
Phenomenon-3 : Abnormal noise and vibration	
Possible causes	Counteraction
○ Too high viscosity of hydraulic oil	○ Check the viscosity grade and preheat the oil for proper viscosity.
○ Suction negative pressure□ exceeding permissible value	○ Check the suction line for pipe/filter clogging
○ Inclusion of air in the suction line (1) Inclusion of air due to low tank oil level (2) Air sucked from the suction line (3) Inclusion of air due to drain pipe or return pipe height above tank oil level.	(1) Increase oil level up to specified level. (2) Check each joint part (loose, imperfection of seals) (3) Modify piping or increase the oil level.
○ Air remaining in the hydraulic circuit	○ Purge out air.
○ Abnormal piping load acting on Rotor Pump body	○ Make the pipeline flexible.
○ The fixture between the pump body and the foot is not removed.	○ Remove the fixture.
○ Too high gousing internal pressure caused by resistance in the drain pipeline	○ Modify the drain pipeline to reduce the internal pressure.
○ Imperfect functioning of hydraulic unit component	○ Take proper corrective actions in accordance with the instruction manuals for the hydraulic unit and the respective hydraulic devices.
○ Abnormal wear or damage of pump internal components	○ Replace the pump

Phenomenon-4 : Oil leak from Rotor Pump	
Possible causes	Counteraction
○ Damaged O-ring or gasket	○ Contact DAIKIN or distributor
○ Loose of bolts/plug	○ Retighten
○ Too much loosening of pressure adjust screw of PC valve	○ Screw-in properly.
○ Too much tightening of discharge adjust screw	○ Loosen properly.

Phenomenon-5 : The surface temperature OF ROTOR Pump housing reaches high degree (90℃ and over)	
Possible causes	Counteraction
○ Too high temperature of tank oil (60℃ and over)	○ Lower the oil temperature. (0 to 60℃)
○ Running under overload exceeding motor capacity	○ Match the operating condition with motor capacity.
○ Abnormal wear or damage of pump internal components	○ Replace the pump

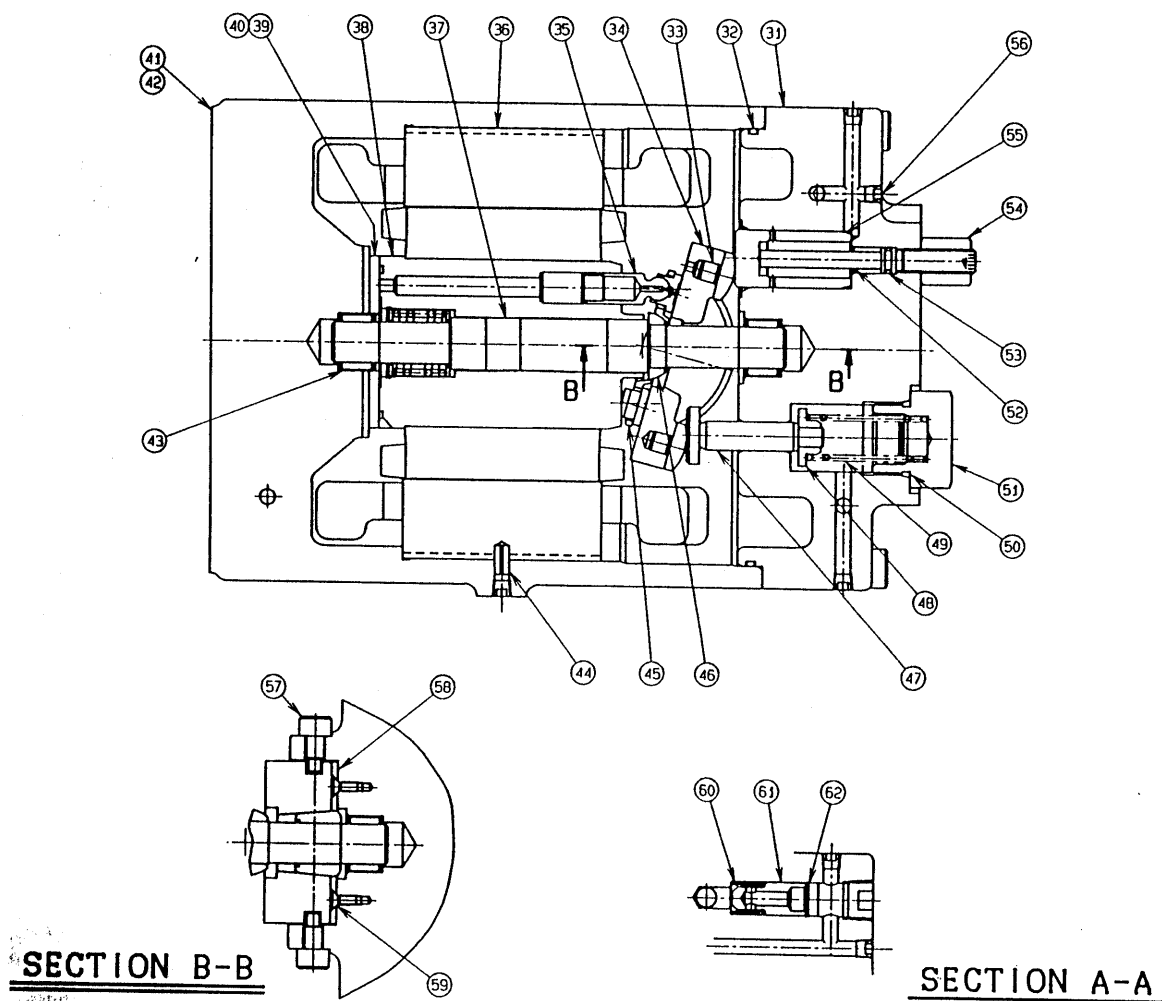
Phenomenon 6 : Pressure compensator control fails to function. It functions, but unstable.	
Possible causes	Counteraction
○ Too high set pressure of PC valve	○ Loosen pressure adjust screw.
○ Air remaining in the hydraulic circuit	○ Purge out air.
○ Over-leakage from the hydraulic circuit	○ Take individual countermeasures against leakage.
○ Running fault or trouble of load equipment	○ Check the load equipment (valves, cylinders etc.)
○ Actuating failure of PC valve	○ Replace.
○ Abnormal wear or damage of pump internal components	○ Replace the pump

10. Reference
10-1. Parts list



部 番	品 名	個 数	部 番	品 名	個 数
1	PLUG	1	16	BOLT	2
2	SEAL WASHER	1	17	REGULAR CIRCULAR WASHER	4
3	NAMEPLATE	1	18	SOCKET HEAD PLUG	2
4	TEARMINAL BOX ASSEMBLY	1	19	PLASTIC PLUG	1
5	EYE-BOLT	2	20	RIVET	2
6	VIBRATION-ABSORBING RUBBER	4	21	NAMEPLATE	1
7	FOOT	1	22	SOCKET HEAD PLUG	1
8	SPRING LOCK WASHER	4	23	SUCTION PORT COVER	1
9	HEXAGON NUT	4	24	GASKET	1
10	SOCKET HEAD BOLT	8	25	SOCKET HEAD BOLT	2
11	PC VALVE ASSEMBLY	1	26	CAUTION PLATE	1
12	SOCKET HEAD BOLT	4	27	SOCKET HEAD PLUG	1
13	GASKET	1	28	PLASTIC PLUG	1
14	SOCKET HEAD PLUG	1	29		
15	O RING	1	30		

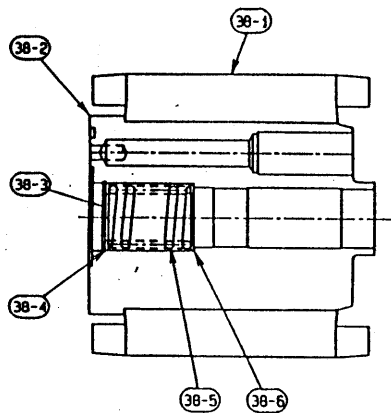
Fig.4



部 番	品 名	個 数	部 番	品 名	個 数
31	FRONT COVER	1	47	BIAS PISTON	1
32	O RING	1	48	SPRING RETAINER	1
33	CONTACT PIECE	2	49	BIAS SPRING	1
34	SWASH PLATE	1	50	O RING	1
35	PISTON ASSEMBLY	9 (7)	51	PLUG	1
36	STATOR	1	52	DISCHARGE ADJUST SCREW	1
37	SHAFT	1	53	O RING	1
38	ROTOR ASSEMBLY	1	54	CAP	1
39	VALVE PLATE	1	55	CONTROL PISTON	1
40	PIN	1	56	SOCKET HEAD PLUG	11
41	HOUSING	1	57	STOPPER	2
42	PIN	2	58	BEARING (JOURNAL)	2
43	BEARING (NEEDLE)	2	59	MACHINE SCREW	2
44	SPRING PIN	1	60	SPRING	1
45	RETAINER	1	61	POPPET	1
46	RETAINER GUIDE	1	62	RETAINING RING	1

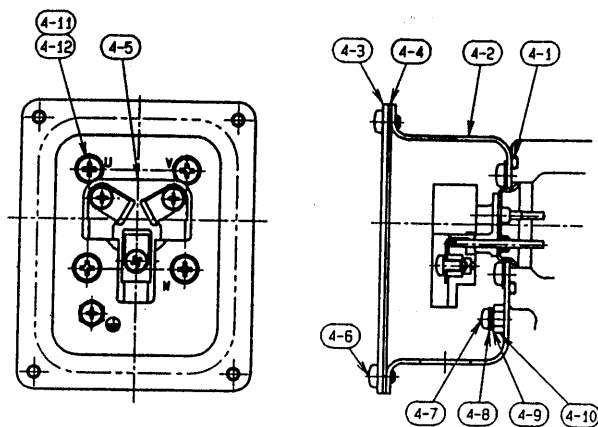
() : RP08 ONLY

Fig.5



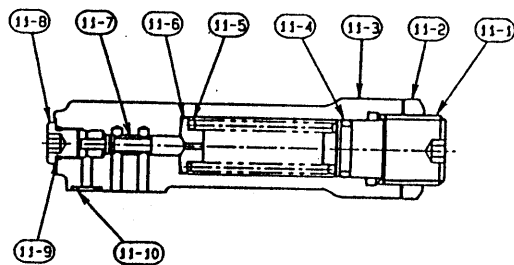
NO.	PARTS NAME	QTY.
38-1	ROTOR (3 PHASE INDUCTION MOTOR)	1
38-2	CYLINDER BLOCK	1
38-3	RING RETAINER	1
38-4	WASHER (1)	1
38-5	SPRING	1
38-5	WASHER (2)	1

Fig.6



部 番	品 名	個 数
4-1	O RING	1
4-2	TERMINAL BOX	1
4-3	COVER	1
4-4	GASKET	1
4-5	TERMINAL	1
4-6	CROSS RECESSED HEAD SCREW	4
4-7	CROSS RECESSED HEAD SCREW	4
4-8	PLAIN WASHER	1
4-9	SPRING WASHER	1
4-10	HEXAGON NUT	1
4-11	CROSS RECESSED HEAD SCREW	4
4-12	SEAL WASHER	4

Fig.7



NO.	PARTS NAME	QTY.
11-1	PRESSURE ADJUSTMENT SCREW	1
11-2	ROCK NUT	1
11-3	VALVE BODY	1
11-4	O RING	1
11-5	SPRING	1
11-6	SPRING RETAINER	1
11-7	SPOOL	1
11-8	SOCKET HEAD BOLT	1
11-9	O RING	1
11-10	O RING	1

Fig.8

Table 1. O-RING LISTS

NUMBER	R P 0 8	R P 1 5	R P 2 3 / 3 8	GTY.
15	JIS B 2401 1- B P14			1
32	AS 568 [MS28775] 160	AS 568 [MS28775] 167	AS 568 [MS28775] 173	1
50	AS 568 [MS28778] 914			1
53	JIS B 2401 1- A P8			1
4-1	JIS B 2401 1- B G45			1
11-4	JIS B 2401 1- B P14			1
11-9	AS 568 [MS28778] 903			1
11-10	JIS B 2401 1- B P6			1

10-2 Output Power Range

The following table shows the current at 200V/50Hz and 220V/60Hz.

MODEL	R P 0 8 - 0 7	
VOLTAGE SUPPLY	200V/50Hz	220V/60Hz
RATED CURRENT = 100% (A)	3 . 8	3 . 4
1 5 0 % (A)	5 . 7	5 . 1
2 0 0 % (A)	7 . 6	6 . 8

The rotor pump is able to operate continuously up to 150 % of rated current, since electric motor is cooled by hydraulic oil.

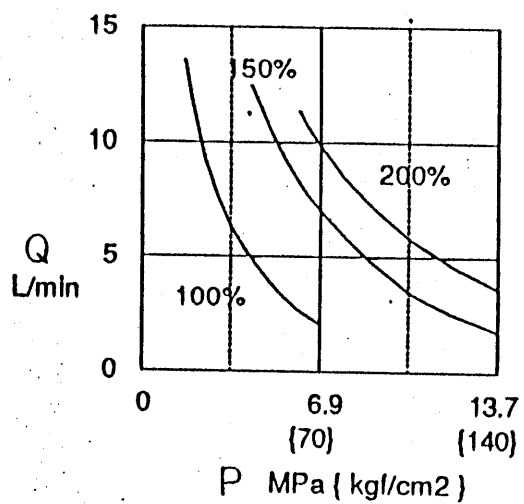
The short time (within 6 seconds) operation in a duty cycle is possible up to 200 % of rated current.

In both conditions, keep the oil temperature in reservoir at 60 °C or less.

MODEL	R P 1 5 - 1 5		R P 1 5 - 2 2	
VOLTAGE SUPPLY	200V/50Hz	220V/60Hz	200V/50Hz	220V/60Hz
RATED CURRENT = 100% (A)	6 . 8	5 . 8	9 . 6	8 . 4
1 5 0 % (A)	1 0 . 2	8 . 7	1 4 . 4	1 2 . 6
2 0 0 % (A)	1 3 . 6	1 1 . 6	1 9 . 2	1 6 . 8

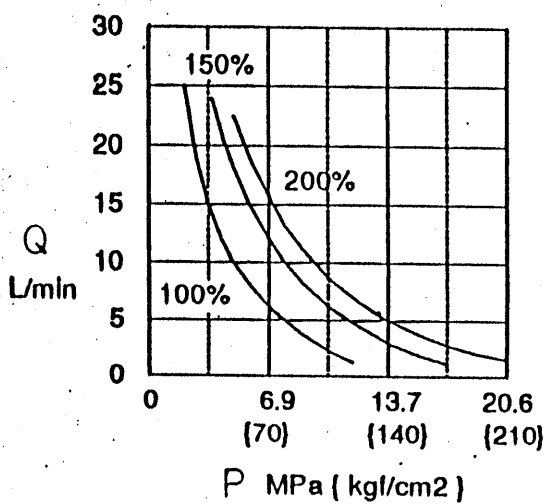
MODEL	R P 2 3 - 2 2		R P 2 3 - 3 7	
VOLTAGE SUPPLY	200V/50Hz	220V/60Hz	200V/50Hz	220V/60Hz
RATED CURRENT = 100% (A)	1 0 . 0	8 . 7	1 5 . 1	1 3 . 4
1 5 0 % (A)	1 5 . 0	1 3 . 1	2 2 . 7	2 0 . 1
2 0 0 % (A)	2 0 . 0	1 7 . 4	3 0 . 2	2 6 . 8

MODEL	R P 3 8 - 3 7		R P 3 8 - 5 5	
VOLTAGE SUPPLY	200V/50Hz	220V/60Hz	200V/50Hz	220V/60Hz
RATED CURRENT = 100% (A)	1 5 . 1	1 3 . 4	2 2 . 0	1 9 . 6
1 5 0 % (A)	2 2 . 7	2 0 . 1	3 3 . 0	2 9 . 4
2 0 0 % (A)	3 0 .	1 7 . 4	4 4 . 0	3 9 . 2

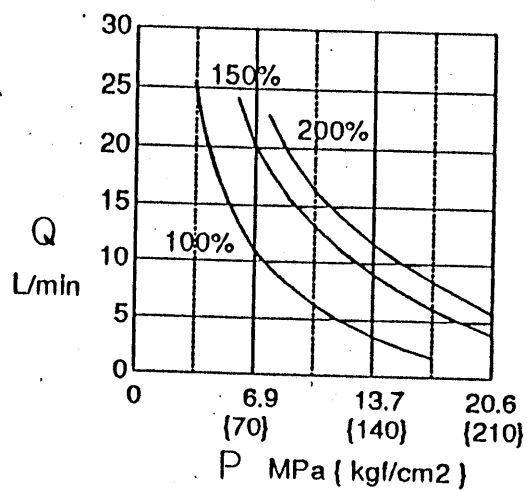


RP 08 - 07 (220V/60Hz)

Fig.9



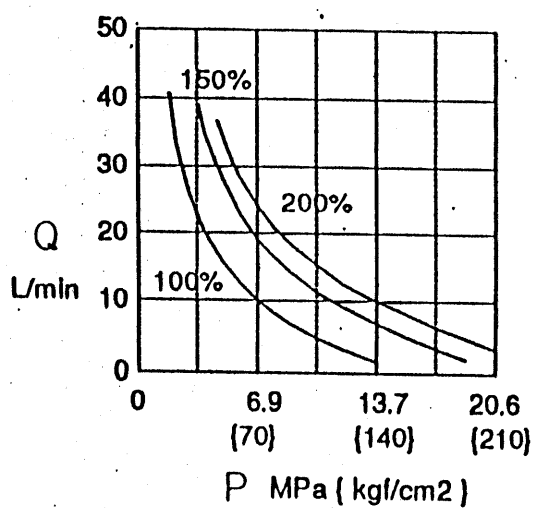
RP 15 - 15 (220V/60Hz)



RP 15 - 22 (220V/60Hz)

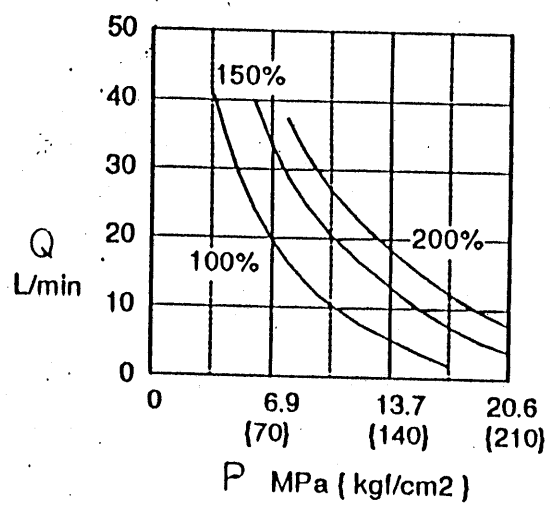
Fig.10

Fig.11



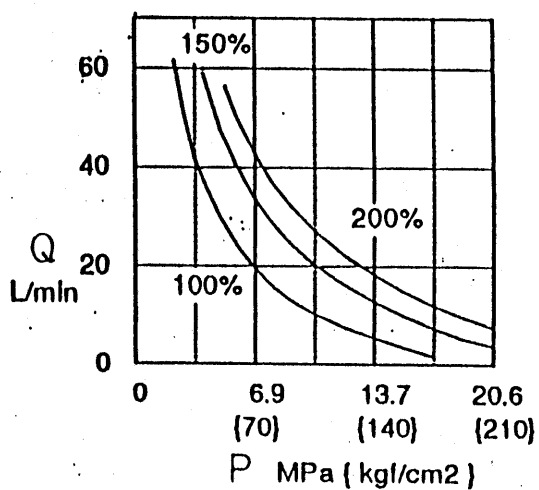
RP 23-22 (220V/60Hz)

Fig.12



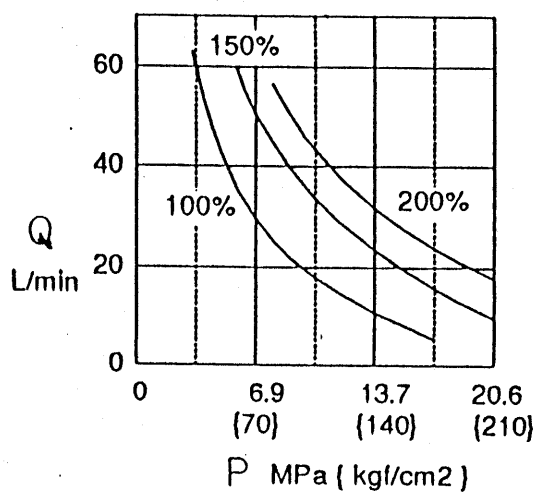
RP 23-37 (220V/60Hz)

Fig.13



RP 38-37 (220V/60Hz)

Fig.14



RP 38-55 (220V/60Hz)

Fig.15

10-3 Adjustment of Discharge Flow

Discharge rate is adjusted by the discharge adjust screw provided on the front cover.

- Clockwise direction ----- Discharge rate is decreased
- Counter-clockwise direction ---- Discharge rate is increased

(Note)

1. Discharge pressure is 2.0MPa.
2. Length L is as follows.

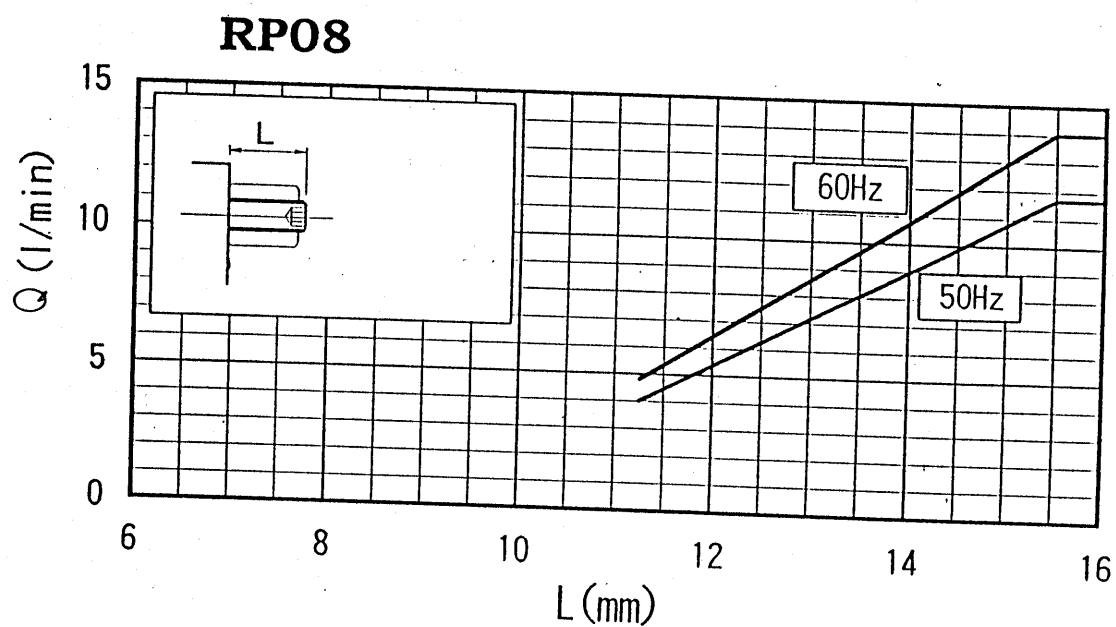
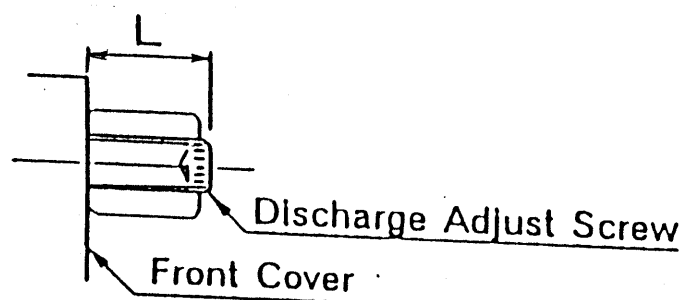


Fig.16

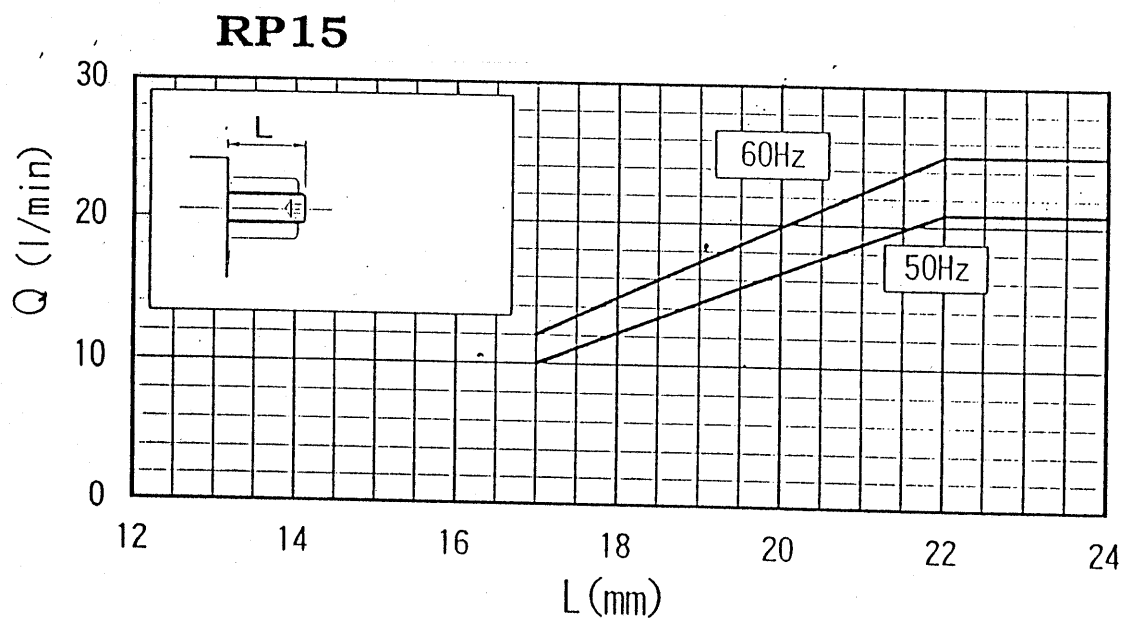


Fig.17

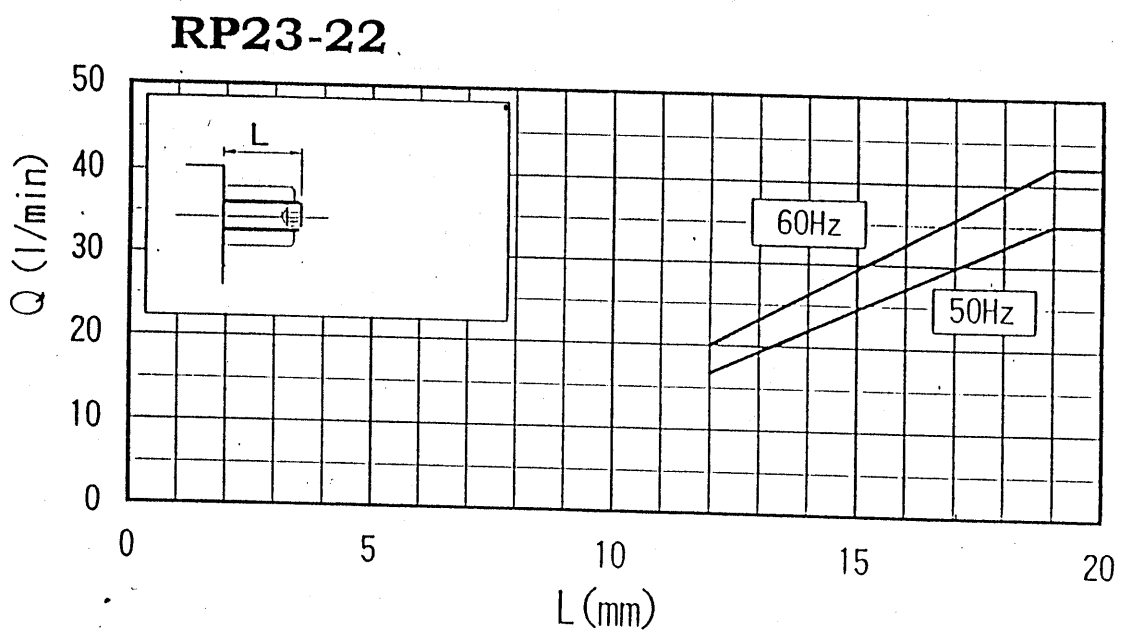


Fig.18

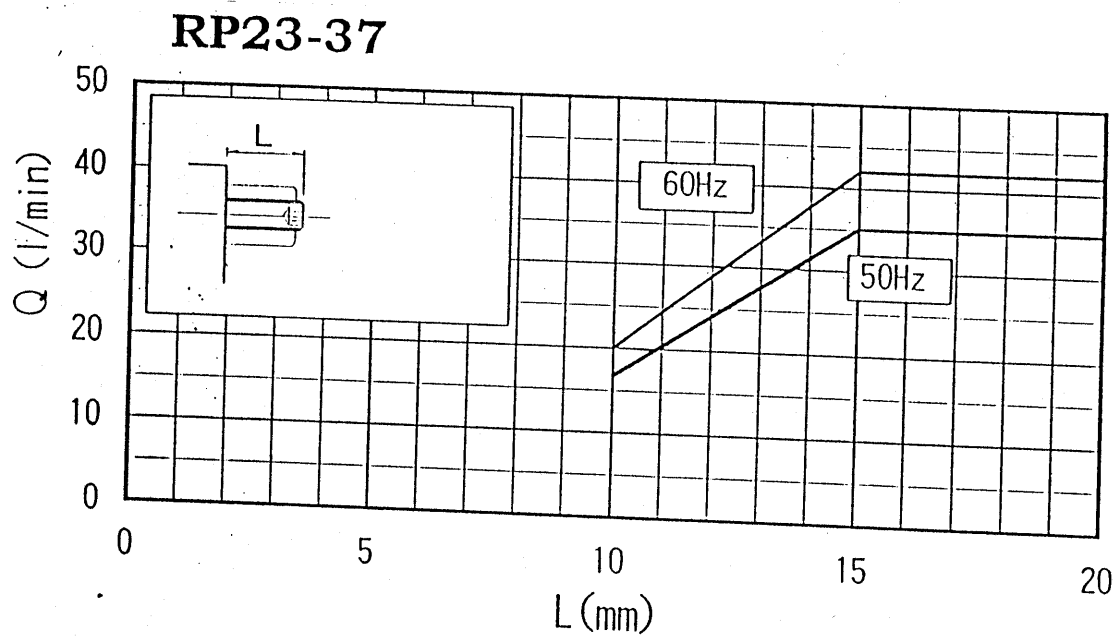


Fig.19

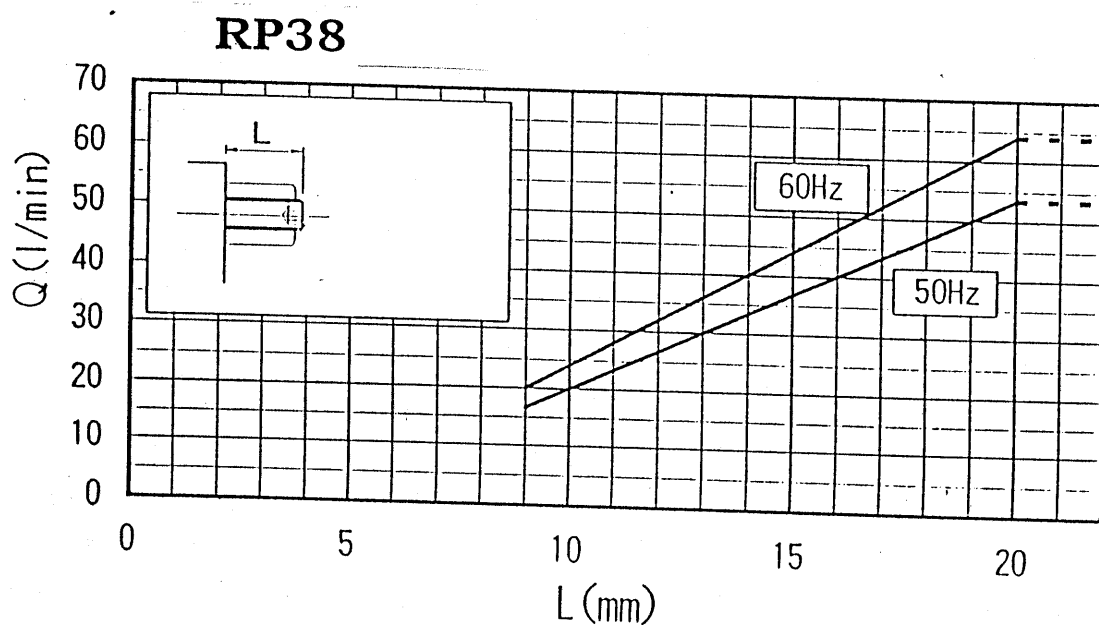


Fig.20

10-4 Adjustment of Discharge Pressure

Maximum discharge pressure is limited by the setting pressure of PC control valve, and be able to adjust by the pressure adjust screw.

- Clockwise direction ----- PC setting pressure is increased
- Counter-clockwise direction ---- PC setting pressure is decreased

Model	Spring No.	Pressure adjusting range
R P * *	1	1.5 ~ 6.9 MPa {15~ 70kgf/cm ² }
	2	1.5 ~ 13.7 MPa {15~ 140kgf/cm ² }
	3	3.4 ~ 20.6 MPa {35~ 210kgf/cm ² }
	5 (*)	1.5 ~ 6.9 MPa {15~ 70kgf/cm ² }

(*) Spring No.5 is only applied to RP15A1-**-30.

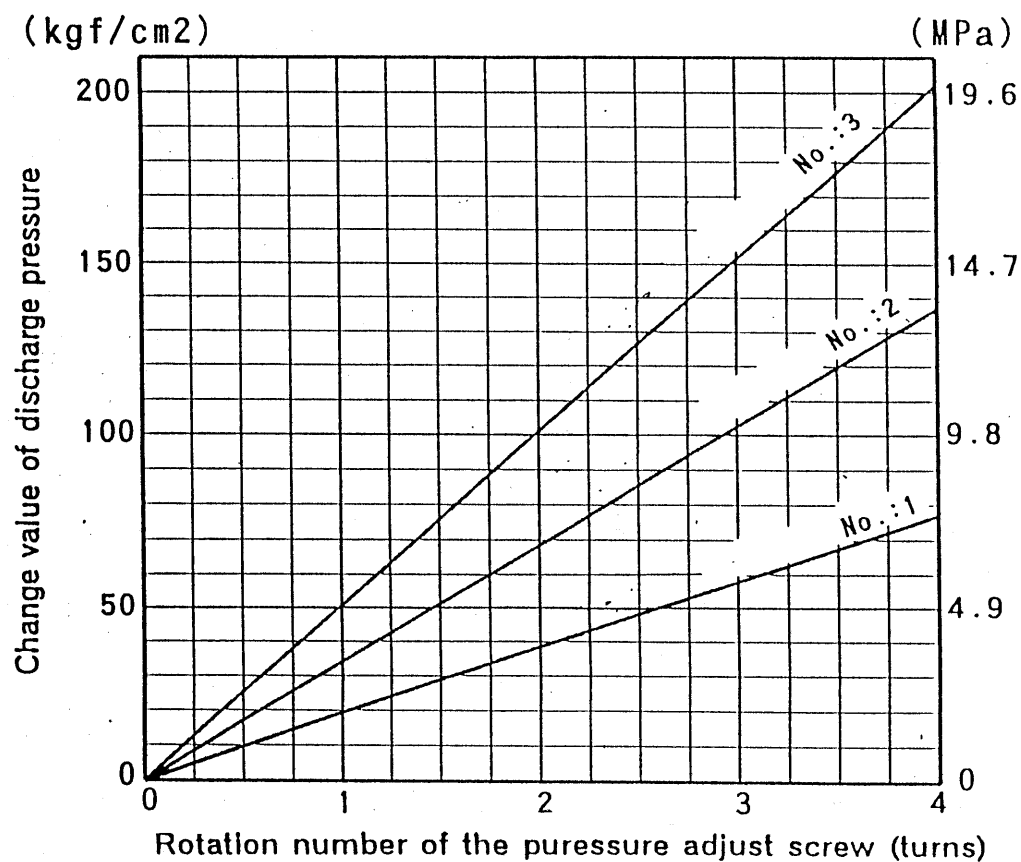


Fig.21